



## **"KNOWLEDGE & SPEED"**

### **THE ANNUAL REPORT ON THE ARMY AFTER NEXT PROJECT TO THE CHIEF OF STAFF OF THE ARMY**

**JULY 1997**

***THIS IS AN EXTRACT OF THE ORIGINAL 1997 ANNUAL AAN REPORT APPROVED BY THE CHIEF OF STAFF OF THE ARMY AND WAS DEVELOPED FOR THE USE OF THE FIRES INTEGRATED IDEA TEAM. THIS EXTRACT INCLUDES THE MAIN SECTION AND APPENDIX A; APPENDICES B-D HAVE BEEN REMOVED. TO SUPPORT SOFTWARE COMPATIBILITY, GRAPHICS HAVE BEEN REMOVED. SELECTED CHARTS ARE PROVIDED SEPARATELY. THE COMPLETE REPORT WILL BE AVAILABLE TO FIRES IIT PARTICIPANTS.***

### **INTRODUCTION**

The Chief of Staff of the Army and the Commander, Training and Doctrine Command established the Army After Next project in February 1996 to help the Army leadership craft a vision of future Army requirements. The project connects the process of change represented by Army XXI and guides future Army research and development programs. This is the TRADOC commander's second annual overview of the AAN program.

Visualizing the future requires a process that anticipates the nature of warfare in the next century and the evolution of US national security requirements. For that purpose, AAN conducts broad studies of future warfare to frame issues vital to the development of the US

Army and to provide those issues to the senior Army leadership in a format suitable for integration into TRADOC combat developments programs. These studies focus on, but are not constrained to, the period 2010 and beyond. The choice of a 30-year point of focus is intended to place a distant intellectual beacon far enough in front of the pace of change so that ideas and a vision of the future will not be constricted by near-term budgetary and institutional influences. Such an approach is needed to break free of the action-reaction cycle of incremental change, which can only hold the future hostage to the past. To ensure a comprehensive and holistic perspective focused on 2025, the program is organized around four broad research areas: the geostrategic setting, the evolution of military art, human and organizational issues, and technology trends.

By 2010, the Army will exploit the Force XXI effort to achieve nothing less than a technological and cultural metamorphosis. By then, over a decade of experimentation and field exercises will create a knowledge-based force, Army XXI, balanced across our traditional imperatives and possessed with a clarity of observation, degree of decentralization, and pace of decision making unparalleled in the history of warfare. AAN simply seeks to provide the Army of 2020 with the physical speed and agility to complement the mental agility inherited from Force XXI.

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**The path to AAN begins with the advanced warfighting experiments and passes through Army XXI.**

Following the conceptual direction set by Force XXI's advanced warfighting experiments, AAN's primary research mechanism is a series of free-play tactical, operational, and strategic war games and war-game excursions designed to explore the character of future warfare and to provide an in-depth joint and multidisciplinary examination of political, social, demographic, and technological trends likely to affect the future of war. Insights derived from games conducted to date comprise the heart of this report. Because they reflect only the first cycle of AAN studies, these insights should be considered suggestive rather than conclusive. Future AAN war games can be expected to refine them significantly.

## **THE PROCESS OF CHANGE**

The history of warfare reveals a cyclical pattern of military change in which evolving technology alternately favors attack or defense. Before the Industrial Age, such cycles alternated slowly because innovation developed and spread slowly. After the Industrial Revolution, the cycles began to accelerate, though they were still somewhat retarded by political and institutional conservatism and the uneven development of military

technologies. By the American Civil War, rifled muskets—the precision weapons of the day—had greatly extended the deadly zone troops had to cross to close with an enemy, a condition favoring the defense. Subsequent advances in artillery led European armies to believe that superior firepower would restore the power of the offensive and with it the possibility of quick, decisive victory. Events proved them wrong. While lethality skyrocketed, the pace of movement across the widening deadly zone remained that of a marching soldier. Technology thus served only to increase the slaughter and to mire armies on both sides in a conflict of attrition to which there seemed no alternative.

By 1918, the Germans had found a partial solution—a method of opportunistic infiltration allowing infantry to transit the deadly zone intact—but they lacked the technology to accelerate the advance enough to reach decisive objectives before the defender could recover. By the onset of World War II, the internal combustion engine, armor plating, and the wireless provided the means to accelerate maneuver. Mechanization allowed troops to cross the deadly zone protected and at high speed. Large units could dash great distances into the enemy's rear. Victory thus came from disintegrating the coherence of the defense and collapsing the psychological will of the defender. Through rapid maneuver supported by mobile firepower, the offensive once again came to dominate warfare.

In the postwar years, the United States and its NATO allies applied microchip technology to develop precise, long-range killing power in an effort to successfully defend against a Soviet-style *blitzkrieg*. The cycle of warfare had turned yet again in favor of the defense. By the mid-1980s, technology had extended the tactical deadly zone to what were once operational and possibly strategic distances. As this trend continues, long-range, precision firepower systems will maintain the defensive as the dominant form of warfare.

To restore the advantage to the offensive, we believe that the Army must devise the means to accelerate the speed of movement across the deadly zone by an order of magnitude or greater. The union of knowledge and speed will do more than increase linear velocity; it will also quicken a commander's ability to divine and exploit an enemy's weaknesses and to offset the influence of chance and uncertainty. The American method of war-making in the future must rely on the offensive if this nation intends, as a matter of policy, to retain the ability to strike rapidly, decide quickly, and finish wars cleanly with minimal loss of life to all sides. Current AAN research is directed at this most vital and pressing challenge.

## THE RATIONALE FOR CHANGE

The historical record of military change is mixed. Some changes, like the Navy's development of carrier aviation in the mid-1930s, Germany's *blitzkrieg*, and the Army's development of airmobile operations in the 1960s, have succeeded. Others, like France's Maginot Line and the US Army's Pentomic reorganization of the 1950s, have not. Generally speaking, those that have failed reflected either too narrow a view of warfare or else a faddish preoccupation with untested theories. The AAN Project consequently embraces a broad view of warfare, particularly since the Army must win wars as well as battles. Accordingly, AAN studies consider warfare in all its dimensions, beginning with its most likely strategic conditions. Fundamental to this perspective is the belief that even the smallest element of the Army must reflect a common unifying thread, beginning with the vital interests of the United States and proceeding through national security policy, military strategy, long-term operational objectives, and, ultimately, the design and employment of every tactical unit.

Based on its broad study of future warfare, AAN research to date indicates that the Army should expect dramatic changes in the dynamics of battle in the period beyond 2010. The remainder of this report discusses those changes as we currently understand them. While many aspects of the future remain indistinct, others have already become discernible. The Army can and should begin now to prepare for the future, even if our desired end state remains only dimly perceived. We can adjust our glide path as our vision of the future gains clarity. Inaction is a decision we cannot afford. The Army must change soon for three reasons:

*First*, every revolution, whether political, economic, or military, unfolds in evolutionary steps. Generally, at least half a generation, about 15 years, is required for vision and ideas to mature into secure and irreversible change. It takes about that long to grow a battalion commander or platoon sergeant or to develop, test, and field major systems. It may take even longer to truly alter the institutional culture sufficiently to internalize revolutionary change. In addition, the Army today finds itself very much a fellow traveler in a grander societal revolution. Global institutions and cultures are busily shifting from the Industrial to the Information Age. The Army today has a foot firmly planted in both ages. Materiel and structures developed in the era of the recent past must now either be modified or replaced to prepare for conflict in the Information Age. Central to this decision is whether current and programmed systems will satisfy the requirements of a 2025 battlefield. Since current AAN research suggests that tomorrow's battlefield will differ from today's in revolutionary ways, the Army's leadership must soon determine how to apportion research and development resources among a host of competing technological alternatives. Also, it must

determine how much of the Army to modernize along current lines before *leapfrogging* Army XXI systems with entirely new technologies and significantly different operational and organizational concepts.

*Second*, the United States currently enjoys unrivaled military supremacy, but this condition may well erode after the turn of the century. Both China and a recovered Russia have the economic potential to become major military competitors, yet any number of military challengers might arise. Such challengers need not seek to match the US in every military category. Instead, they merely need to acquire capabilities intended to counter critical American advantages—in sensor technology, for example—depriving US forces of the assurance of rapid battlefield dominance and raising the political costs of military intervention. That approach would especially appeal to armies building or rebuilding from a relatively small technology base, as the Germans did after World War I. Such armies would have few sunk costs. Indeed, current AAN research strongly suggests that any serious military threat between now and the 2025 period will very likely involve asymmetric forces designed specifically to threaten US superiority in areas requiring long development and deployment lead times.

*Third*, if not corrected soon, the current emphasis on a method of warfighting that emphasizes firepower at the expense of maneuver may well result in a protracted war characterized by stalemate, attrition, and unacceptable loss of life to both sides. Recent experience in war and insights from the AAN series of war games demonstrate that, even in the age of precision warfare, the principal benefit to be derived from firepower is the psychological paralysis of the enemy, not his physical destruction. Unfortunately, this benefit decreases over time as an enemy inures himself to the shock of firepower and learns to “maneuver under precision” through the use of deception, dispersion, and maneuver by infiltration.

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**In war, the psychological dominates the physical. Since the psychological effects of firepower erode over time, decision should be sought quickly. To do otherwise invites unnecessary risk.**

Quite likely by 2025, a competent enemy may also be able to counter American advantages in precision firepower with a variety of precision and counterprecision technologies of his own. If American military forces are to win quickly and decisively at low cost, they must have the means to conduct battle rapidly and to end it cleanly at the moment when the paralytic effect of firepower is greatest. As the figure above demonstrates, to delay beyond the high point of effect only prolongs the killing and stiffens the enemy's will to resist. Decisive victory ultimately must be achieved by forces on the ground. Psychological

collapse—the breaking of an enemy’s will to resist—results when an opponent finds himself challenged and blocked wherever he turns. Restoration of the balance between fire and maneuver will take time, at least a decade or more, and the process must begin soon.

## **THE PACE OF CHANGE**

Adapting to change is difficult for any army. At best, changing a military organization too quickly may result in acquisition of immature or inappropriate capabilities. At worst, it can threaten the doctrinal and organizational cohesion on which any fighting force depends. But as armies throughout history have learned to their dismay, failure to adapt is equally deadly. Sunk costs or budgetary penury may preclude adoption of new technologies, while institutional conservatism may prevent their effective exploitation. In either case, failure to adapt ultimately results in squandered lives and military defeat. Our challenge today is to get the balance right. And with system wear-out only about 12 years away, we have just enough time to do it. The diagram below makes this point.

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**The challenge is to change the force without putting it at risk. The rate of change must accommodate both affordability and acceptability.**

The steep axis of change is undesirable because too great an angle encourages too rapid a lock on systems that might be quickly outdated. Another risk on this axis—perhaps even greater than premature materiel lock-in—is that of disrupting the organization without achieving a real increase in fighting capability, simply to be seen to outside audiences as “doing something.” The Pentomic reorganization of the 1950s was perhaps the clearest recent example of such a misplaced impulse.

The shallow axis is equally undesirable because too slow a rate of change may miss the revolution altogether. For years after World War I the tank was widely seen as an infantry support weapon, though hindsight proved its value as a primary instrument of maneuver. When the dynamics of the battlefield change rapidly—and we believe such change is occurring now—so also must the rate of adaptation. Rapid military change is not unprecedented. But too often in the past, its driving impulse has been prior defeat. We believe effective adaptation is possible without that unpleasant incentive.

As a general observation, near-term change tends to focus on force structure and equipment. Planning for more distant futures tends to concern capabilities and

possibilities—the *how* rather than the *who* or *what*. While pragmatic near-term planners try to improve existing systems, longer-term visionaries can deal in theory and emerging capabilities in a more abstract fashion. The challenge is linking the two without allowing the present to consume the future, or the vision to become intellectually sterile. While focusing on capabilities, AAN seeks at the same time to think through the organizational and human changes that will be required to exploit those capabilities.

## **THE PROCESS OF CHANGE: MID- AND LONG-RANGE**

TRADOC's commander once commented that the AAN was about "ideas, not concepts." That is a succinct description of AAN's orientation. The AAN Project has become a laboratory—part technology-oriented, part military science—in which the Army works with other services and agencies of government, academic institutions, and civilian industry to build ideas about the future. AAN differs perhaps from the efforts of other futures groups in that its participants take extra care to subject ideas to both the considered experience of military history and the analytical rigor of state-of-the-art gaming.

AAN is the flagship program among several studies whose purpose is to assist the Army's leaders to establish priorities and earmark resources to maintain force readiness today and in the future. The findings and analyses developed by the AAN Project and provided to the planners of the DCSOPS Office of Strategy, Plans, and Policy help set the more distant parameters that will guide Army long-range planning.

As a result of this year's study, a more complete understanding of the Army's long-range process of change is beginning to emerge. In general, the process divides into three *armies*: the current force, the programmed force, and the potential force.

The *current force* is today's Army in the field, ready to fight. TRADOC's obligation to this army is training and doctrine. Pursuant to that obligation, TRADOC soon will publish the newest edition of FM 100-5, *Operations*, the Army's keystone doctrinal manual, last revised in 1993.

The second force falls under TRADOC's combat developments responsibility. Roughly equivalent to the *programmed force*, it is the army in near-term development, which is undergoing upgrades to existing systems in order to take advantage of new technologies and opportunities immediately available for organizational improvement. This force falls within the influence of the Program Objective Memorandum, which tends to lock large programs within a 5-to-7-year period to compete within the budget process. The programmed force is aimed at the midterm future. In 1940, this would have been the Louisiana Maneuver force. Today, it is Army XXI. TRADOC's *battle labs* were established

specifically to extend as far as possible the period of experimentation within the POM's influence. Programmed force development is guided by TRADOC Pamphlet 525-5 and addresses the familiar TRADOC requirements: doctrine, training, leaders, organizations, materiel, and soldiers.

The third or *potential force* is the one with which AAN is primarily concerned. Here the focus shifts from improvement of fielded capabilities to long-term research and development programs; and from current and programmed force structures to as-yet-unspecified capabilities associated with our emerging vision of future warfare. Implied is a similar shift from the sorts of Cold War challenges that shaped the creation of today's Army, to the more ambiguous and variegated global military challenges likely to confront America and her allies in the next century. Hence, while some of the associated technologies may be revolutionary, the potential force itself should be viewed essentially as the next logical step in a continuing adaptation of military capabilities to the changing dynamics of war and requirements of national security. Next summer TRADOC will publish a new pamphlet, 525-6, that will capture the emerging ideas of AAN in order to help the senior leadership craft its vision of future warfighting. The pamphlet will serve as the Army's *distant beacon* to guide the combat developments process for the mid- to long-term future.

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**A process exists to facilitate the orderly development of distant ideas into today's reality.**

Because of this anticipatory function, AAN furnishes the primary link to other DOD agencies engaged in long-term development—for example, Defense Advanced Research Projects Agency projects and various Defense Science Board studies. As with AAN, such efforts typically aim well beyond DTLOMS and frequently push the outer bounds of practicality. Moreover, because the potential force is not hostage to the POM, it represents the most promising opportunity for true integration with sister service concepts, such as the Air Force's ultra-high-altitude UAV and the Marine Corps' small-unit operations study.

The wellspring of AAN is the Army leadership's vision of the role and function of land power in the 30-year future and beyond. AAN's four broad areas of study all seek to clarify developments in geopolitics, military art, human and organizational issues, and technology that are today only dimly perceived, and then integrate those insights with those of other services into a cohesive joint view of future warfare. At the same time, AAN is closely connected with *futures* programs in DOD and other government agencies, including partnerships with AAN *franchise* programs in the US Army Space and Strategic Defense



Command (SSDC), US Army Special Operations Command, and TRADOC's Combined Arms Support Command.

In sum, AAN's objective is to provide the Army's leadership the raw materiel for a vision of war, and thus of land-power's role, in the 30-year future. To accomplish that objective, the AAN process must be continuous, year after year, so that the Army's vision is always extended and linked to developments in other services. Provided it remains solidly connected to technological and organizational development, such a process is the Army's best assurance of a smooth and effective glide path to the future.

### **A GEOSTRATEGIC VIEW OF 2025**

The most difficult yet essential aspect of defining land-power capabilities 30 years in the future is forecasting the security requirements those capabilities must satisfy. Clearly, we cannot predict with precision the future geostrategic condition of a world that even today is changing at an unprecedented pace. We can however recognize those enduring national interests that any future land power force must be able to support.

#### **AMERICAN NATIONAL INTERESTS THROUGH 2025**

For the purpose of AAN studies, interests subdivide into *vital* and *important*. The boundary between these categories is neither rigid nor immutable, particularly since statesmen have a habit of transmuting important into vital interests when the former are challenged. But the categories at least help distinguish objectives for which the nation is willing to risk unlimited liability from others whose importance tends to be more circumstantial. Among vital interests, AAN recognizes—

- Deterrence and prevention of nuclear, biological, or chemical attack on the United States and its allies, and continuing reduction of the threat of such attack. Implied is the maintenance of effective control over formerly Soviet nuclear weapons and weapons-usable materiel.
- Prevention of the rise of a powerful, hostile hegemony in Asia or Europe. Implied are the continued safety, freedom, and prosperity of friendly nations in both regions, maintenance and improvement of effective alliances like NATO, and deterrence of aggressive ambitions on the part of China or a resurgent Russia.
- Continued unhindered access by the United States and our allies to global resources—especially energy resources—essential to our economic health.

In addition to these overriding interests, the United States will continue to pursue objectives that are less vital, but still important enough to justify the selective use of force. Examples might include preventing the emergence of a hostile regional hegemony in the

Persian Gulf and maintaining the peace and security of the Korean peninsula, the Taiwan Straits, and the South China Sea. The US will also continue current efforts to suppress and combat international terrorism, drug trafficking, and transnational crime.

Given these interests, the United States can be expected to remain heavily involved in the world of 2025—a leader in both multinational and bilateral defense arrangements and an active promoter, as we are today, of democratic principles, free market economies, and human rights. Were the United States to renounce global leadership and turn inward as we did in the 1930s, the effect would be felt profoundly throughout the world, creating a power vacuum almost certain to produce uncertainty and unrest—historical precursors of global conflict.

There is, however, no reason today to suppose that the United States will turn inward even if we could. On the contrary, every indication is that we will continue to maintain sufficient power to play a decisive international role. Thus AAN assumes a world in which the United States remains engaged, retaining the military power to support regional alliances and to deter or defeat major military competitors. In this year's studies and war games, our analytical focus was on hypothetical challenges to vital interests in 2021. This summer, the study effort will expand to include examination of potential conflicts involving *less-than-vital* interests. The following chart summarizes the expected features of the threat spectrum associated with pursuit of both vital and important national interests during the next 30 years.

## **RISE OF A MAJOR MILITARY COMPETITOR**

From the beginning, the AAN Project has found problems with the term *peer competitor*. While a mirror-image peer may serve DOD and service programmatic objectives, AAN believes that the term *major military competitor* better characterizes the military challenge to the United States for the next 30 years.

*Peer competitor* implies the mirror-image, action-reaction stasis inherited from the Cold War. In fact, due to disparities in disposable wealth and the competence of the American technological base, current US military superiority will continue to discourage would-be aggressors from engaging in head-to-head competition. Today, already seven years into the new millennium, evidence indicates that many states concede US technical dominance and have sought alternative strategies to neutralize US strengths. These states do not seem particularly concerned with the acquisition of sophisticated, state-of-the-art weaponry. They are inclined to purchase weapons that provide relatively cheap counters against our air and sea systems such as land and sea mines, distributed air defense, coastal seacraft, submarines,

inexpensive cruise and ballistic missiles, and unsophisticated weapons of mass destruction. Such strategies offer a less sophisticated enemy the ability to dampen, delay, and disrupt the high-tech offensive power of an advanced military force without the inherent expense of purchasing battlefield symmetry. These states will likely offset technological inferiority with asymmetric approaches, which might well include the ability to field mass armies, to incite popular will, and to exploit the inherent strength of the strategic defensive.

Identifying China and Russia as potential major military competitors suggests that control or deterrence of military hostilities will remain an objective of future American national defense policy. While the potential exists for other military competitors to rise, AAN believes that, thus far, China and Russia offer the greatest challenge. For purposes of this study, AAN defines major military competition as “first-tier state with a modernized military establishment and cultural and strategic predilections counter to the vital interests of the United States or its allies.”

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**America’s strategic challenge is to prepare for the rise of a major military competitor who is both competent and capable.**

## **NATIONAL SECURITY STRATEGY IN 2025**

Ideally, the pursuit of national interests is translated into action through a coherent national security strategy that balances requirements against capabilities. AAN assumes that US national security strategy through 2025 will continue to exhibit a fundamental continuity. While incorporating new capabilities and operational techniques, US military forces will continue to support allies, deter potential adversaries, and respond as required to unforeseen military and humanitarian contingencies. Forward-based forces will continue to play a vital role in supporting these objectives, not only in terms of their operational effectiveness, but even more importantly as the clearest demonstration possible of US national will and commitment to the defense of its allies and interests. Yet, as events in the recent past have shown, even the best positioned and most potent military force can fail to deter, particularly if an opponent misjudges American resolve because of his own ignorance or cultural bias. Therefore, actual or threatened military aggression will usually require the deployment of major fighting forces from the United States directly into threatened regions to resolve the issue.

## **MILITARY ART AND SCIENCE IN 2025**

The proliferation of precision weaponry by 2025 will expand the battlespace enormously in terms of size and lethality—conditions that will favor the defense. Additionally, the ability to see the battlefield more clearly through information technology will heighten the defender's advantage by making attacking forces easier to detect and by allowing the defender to mass battlefield fires and other effects more accurately. This year's AAN war games indicate that, unless the speed of movement increases substantially, those improvements in detection and the precision-fire delivery will make offensive action infinitely more difficult.

Fortunately, knowledge—battlefield information—is a two-edged sword. Mating superior knowledge with speed of movement can provide the means to frustrate the defender's ability to acquire and mass fires and thus allow an attacker to cross the deadly zone intact to accomplish an operationally decisive maneuver. Since operational art, by definition, entails employing tactical successes to achieve strategic ends, increasing the speed of movement across all three levels of warfare must become the driving imperative of future military development.

### **THE FY 1997 WAR GAME SERIES**

During FY 97, AAN conducted a series of futuristic war games to frame strategic and operational issues likely to influence war against a major competitor in 2020. The three TRADOC-organized war games consisted of operational-level, force-on-force games at the TRADOC Analysis Center at Fort Leavenworth (the Leavenworth Games), the Winter War Game at Carlisle Barracks (WWG 97), and a series of excursions derived from the WWG to provide a sensitivity check of the WWG major events. All games were open-ended, free-play exercises with an active and unfettered Red force. All services participated. The WWG included world-class representatives from the executive branch, industry, academia, the military, and other government agencies.

The games played a 2020 Blue force capable of order-of-magnitude increases in speed, which we propose can only be achieved by rotating the traditional two-dimensional orientation of land forces upward into the atmosphere and space. A more refined understanding of the character of this force emerged during the course of the war-game series. An independent contractor associated with the DOD Revolution in Military Affairs (RMA) study effort constructed a hypothetical Red force designed to present an asymmetric threat to US 2020 force structure.

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**Operational and tactical speed necessary to cross the deadly zone intact can only be achieved by orienting a two-dimensional land power force upward into the atmosphere and space.**

## **THE LEAVENWORTH GAMES**

The Leavenworth games explored force-on-force combat between notional forces at the tactical and operational levels. The principal objective was to develop a basis for determining conflict resolution in the WWG. Four subgames took place. The first pitted an Army XXI division against a Red 2020 force. The second and third placed a Blue 2020 force in opposition to the Red force in two different combinations of terrain. The last evaluated enhanced Marine Corps capabilities against the Red force. The games involved four variables: terrain, including urbanized areas; size and posture of the enemy force; support available but located outside the engagement area; and the level and quality of information dominance on both sides.

The principal finding of the Leavenworth games was that mobility, characterized predominantly by speed of maneuver, proved to be the most important factor contributing to battlefield success. Further, battlefield knowledge actually enabled speed, though the precise relationship to date remains difficult to determine. To help isolate the contribution of knowledge to combat outcomes, the AAN staff defined three tiers of relative battlefield knowledge. A tier-one force possessed limited knowledge of the enemy plan and intent, but could achieve information dominance for specific periods of time; this force could exploit certain limited windows of opportunity. With tier-two capabilities, a force could understand significant aspects of the enemy's plan, could recognize his intentions at key decision points, and could react to take advantage of those decisions. With tier-three capabilities, the force could see the enemy as an organizational whole, including his pattern of operations, task organization, phasing and tempo; in short, Blue could understand Red's intent and could develop and execute a plan to counter that intent. The introduction of a force capable of tier-three knowledge superiority changed the time cycles and patterns of maneuver between opposing forces fundamentally and dramatically; Blue could enter the engagement more quickly, achieve decisions more rapidly, finish the fight faster, and reengage the enemy elsewhere. The Leavenworth games offered the following insights.

### **Maneuver**

A significant finding of the AAN war games was that superior knowledge permits a commander to apply each discrete part of his force in a single simultaneous act of

overwhelming fire and maneuver. Knowledge dominance on the battlefield will allow a dramatic increase in the speed of maneuver. A relationship exists between knowledge and precision that permits maneuver forces to employ an ambush dynamic against opponents on an almost routine basis. Precision in maneuver might take any number of forms. One example is highly refined targeting and maneuver directed against individual enemy elements by small units moving at great speed under leaders following mission orders. After several game turns, the Red commander knew that a Blue force with knowledge advantage and speed was unstoppable, and that his only options were to hold in place and concede or execute a series of disjointed, uncoordinated attacks and suffer defeat in detail. In either case, the practical result on the battlefield was always the same: immediate and dramatic disintegration.

Blue forces employed an air-ground tactical method of maneuver that combined lighter surface fighting vehicles with advanced airframes capable of transporting them at speeds as great as 200 kilometers per hour over distances in excess of 1500 kilometers. This method allowed, among other things, a more extensive use of the vertical dimension of the battlespace which, coupled with superior levels of information dominance, permitted greater speed and precision in maneuver. Terrain came to serve a protective and concealing function without restricting mobility; and the resultant ability to accelerate movement through the battle zone enhanced force survivability by frustrating the enemy's capability to detect, track, and engage Blue forces.

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**Air-ground maneuver uses the ground tactically without relying on it for mobility. In the Leavenworth games, an AAN battle force was able to catch and defeat two moving enemy divisions in a remarkably short time.**

### **Asymmetric Responses**

Red's learning curve rose sharply as the games progressed. Confronted by overwhelming combat power, he resorted to asymmetric responses in an effort to offset Blue's advantages. He recognized early on that Blue's superiority, particularly in firepower and information dominance, eroded over time. Any action that heightened ambiguity or complexity, and thus increased the time Blue needed to gain control of the situation, benefited Red. Therefore, Red moved rapidly to complex terrain—urban, suburban, and, in some cases, forests and mountains. He used his limited information warfare capabilities to slow Blue maneuver through electronic warfare and deception. Although Red lost, his

asymmetric responses partially succeeded: he managed to degrade Blue's precision, to slow his operational tempo, and to significantly increase the damage to the Blue force. The lesson is obvious. For the 2020 Blue forces, time is the worst of enemies.

## **THE WINTER WAR GAME**

The strategic, or winter, war game forms the capstone event in the annual AAN cycle. This year's WWG focused on the whole realm of political, strategic, and operational levels of a *most vital* war in 2020 to identify issues related to the changing character of warfare in about 2025. (The complete game analysis is appended.)

The Blue force employed in the WWG represented a multifunctional *total* army concept. It consisted of Special Operations Forces providing an essential *global scout* function, forward-deployed Army XXI forces performing deterrence and condition-setting roles, a global strike force composed of AAN battle forces, and a force of decision consisting of CONUS-based Army XXI units operating as a consolidating force that insured the ability to fight sustained combat should the campaign last longer than expected or take an unexpected turn. In effect, the WWG Blue force represented an army in transition, from the Army XXI legacy force to the notional 2020 AAN battle force of the Leavenworth games.

A portion of the legacy force was deployed in Europe, but scattered in partnership-for-peace packets—so dispersed as to offer the capacity for only limited resistance when Red began threatening aggression. Modernized 2020 forces were concentrated in CONUS, with the exception of a 2020 force deployed in Korea as part of the Army's 2020 modernization plan. Special Operations Forces were present in Europe prior to hostilities. They established close and trusting relationships with nontreaty states in the region and this provided the *glue* that held together a quickly assembled coalition of warfighting partners. They also provided the first reliable theater-level eyes-on-target and helped prepare for the arrival of Blue forces. In deployment into battle, the Blue 2020 forces reached conflict termination before the legacy systems could close on the theater. The WWG offered significant insights on the influence that speed and knowledge will have on a future battlefield.

## **Speed**

Speed emerged once again as a dominant factor at the strategic-political, strategic-military, and operational levels of war. Technology's impact on the speed of political decision making during crisis complicates the National Command Authorities' problems of deterrence and response and the always-difficult problems of forming coalitions of willing

allies and reluctant friends. Paradoxically, the very capabilities that allow future forces to increase speed and tempo may contribute to hesitation on the part of political leaders.

Strategic speed—very rapid deployment directly into a theater of operations—as played in the WWG allowed political leaders and military commanders to accelerate movement to a theater of war before the enemy can set or make a preemptive move. In a subsequent war game excursion, an earlier Blue deployment effectively deterred Red's aggression. Concerns emerged during the game over an obvious disparity between the strategic speed of an AAN force—arriving from CONUS ready to fight within 48 hours—and the follow-on CONUS-based Army XXI force. To allow the ability both to preempt an enemy from setting his force in a theater and to continue unrelenting sustained pressure over time, the projection schemes of both forces should be seamless and firmly joined. It became clear during the game that by 2020 a mature Army XXI force must be much more projectable than heavy forces are today, inferring perhaps the requirement to move globally from a staging point to a distant battlefield in no less than two weeks. Also the war game reinforced the observation that most of the information technologies inherent in AAN should be present in an Army XXI force to ensure that both can act in harmony on the battlefield and collectively exploit the advantages of a knowledge-based force.

The challenge of connecting the deployment of forces with dramatically different strategic speeds was exacerbated by the requirement that arose during the game to approach the theater by infiltration rather than by staging. During the Leavenworth games, it became apparent that even when opposed by an enemy possessing primitive weapons of mass destruction, the risk of mass casualties prohibited the use of major ports and airfields. The enemy quickly realized that his greatest opportunity for success when facing a force of such enormous capability was to defeat him before arrival in theater. Therefore, early-arriving AAN forces were obliged to set down at scattered locations deep inside the theater of war just beyond the reach of the enemy's operational forces.

Operationally, the WWG suggests that sequenced operations, as understood today, should occur in a more seamless and simultaneous manner at theater level, melding the application of firepower and maneuver into a single culminating act and thereby reducing the duration of campaigns from months to days or hours.

**[slides are provided separately as Slides #6 and #7]**

**Future power projection will allow AAN forces to start decisive action before the enemy sets.  
Decision will be assured through the seamless integration of Army XXI forces.**



The geostrategic position of the United States has committed the Army in this century to rely on strategic maneuver to win wars on the ground. The major difference between General Marshall's concepts of power projection in 1942 and the Army's of 2025 is the speed with which forces can be deployed and employed in a single, unrelenting, sustained act of global maneuver. Early discussions of global force projection indicate that the worldwide structure that will enable Army forces of 2025 to conduct high-tempo strategic maneuver must be in place prior to deployment. The early placement of logistics, communications, and intelligence may play a more significant role in the pace and effectiveness of strategic maneuver than the deployment of the fighting force itself.

Logistics in the WWG, the Leavenworth games, and the war-game excursions were played primarily as a function of deployment. AAN's hypotheses, which require further testing in FY 98, posit that to achieve the speed necessary to cross the deadly zone intact, operational-level forces require a radically streamlined logistical tail. Second, strategic-level deployment requires new technologies and methods of projection that get a fighting force from its CONUS base into combat in a few days. Current deployment systems, based on an outmoded Cold War view of strategic maneuver, will only present the enemy with targets in a precision-rich theater of war.

### **Knowledge Sensitivity**

In the WWG, Red reacted to Blue's deployment by immediately attacking the systems that Blue relied on for knowledge dominance, especially space-based systems. Red's all-out attack in space caused policy and warfighting dilemmas for Blue. The erosion of Blue's ability to use space-based assets would have, over time, significantly reduced Blue's knowledge advantage. As it happened, Blue's war with Red ended before attrition of space assets could influence events on the battlefield. Forces already in contact mitigated the loss of satellites to some extent by using organic means, such as high-altitude UAVs, to maintain tactical knowledge dominance. Strategically and at the theater level, however, the loss of specific systems would have had a cumulatively harmful, though not disastrous, effect. Blue's Pacific campaign against Pink, just getting underway when the game ended, was partially blinded by Red's actions. The effect on global logistics would have been felt immediately. A subsequent war-game excursion that varied the nature of Red's attack on space-

based assets did not materially affect the outcome of the game. Nonetheless, in both war games Red commanders understood how vital information dominance was to Blue force effectiveness. Both aggressively sought to collapse Blue's protective shield of knowledge. The insights from the games suggest a serious need to protect information flow through robust, resilient, and redundant infrastructures that can be reinforced with a *bodyguard* of deception and disinformation and easily regenerated if damaged.

### **EMERGING CHARACTERISTICS OF THE FORCE**

Thus far, AAN study results indicate that success on the 2025 battlefield will require force characteristics that emphasize a robust surface-to-space continuum, split-based operations, interdependence, hybrid forces, and mature leaders leading cohesive units.

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**By Winter War Game D+6, the joint application of AAN-era forces quickly disintegrated the opposition and delivered a strategically decisive victory.**

### **Surface-to-Space Continuum: The New High Ground**

In order to achieve the degree of knowledge dominance and operational speed postulated in this paper, by 2025 the Army must have shifted upward from its traditional two-dimensional spatial orientation of land forces into the vertical or third dimension. In particular, the deep-strike operational maneuver function must be able to occupy the third dimension from just above the surface through the exosphere into space. Future land combat units will exploit terrain by maneuvering for tactical advantage within the folds and undulations of the earth's surface without suffering the restrictions imposed on mobility by contact with the ground.

The vertical component should also include tactical UAVs, exospheric long-endurance UAVs, and space vehicles in various orbital configurations extending to geosynchronous orbits. This constellation of aerial vehicles should allow traditionally land-bound functions—intelligence, all forms of communications, and fire support delivered from unmanned platforms orbiting continuously above close combat forces—to move upward. Many of the elements in the

continuum will come from other services and from the civilian telecommunications industry.

**[slide provided separately]**

**AAN operations will be characterized by the domination of the surface-to-space continuum with vastly improved capabilities in mobility, lethality, surveillance, communication, and sustainment.**

### **Split-Based Operations**

A robust surface-to-space continuum—consisting of a constellation of UAVs and space-based telecommunications satellites—will also permit an order-of-magnitude reduction in the size of the tactical force arrayed in close contact with the enemy. *Reach-out* communications, intelligence, and fire support, combined with *just-in-time* and *just-what's-needed* logistics, will eliminate all baggage not directly related to closing with or gaining positional advantage over the enemy. To achieve a relative degree of protection and security, support units will operate from separate locations, possibly hundreds of kilometers from the theater, beyond the effective range of weapons of mass destruction.

### **Interdependence**

Time is the enemy of a force that depends on knowledge and speed for effectiveness. The effect of time on the conduct of battle is corrosive and gradual rather than dramatic. As we learned in the Leavenworth games and subsequent analyses, the shock effect upon which much of the effectiveness of US combat power depends dissipates as the enemy becomes inured to the psychological impact of precision fire and learns to lessen its destructive effects through counteraction. Also, as the Red commander demonstrated, even a tier-three knowledge advantage inevitably erodes as the enemy learns our patterns of operations and begins to predict our actions.

Finally, the strategic game suggested that in a future era of informal and ad hoc military relationships, coalitions may become more difficult to create and harder to maintain once combat begins. Lingering too long on the battlefield opens the opportunity for an enemy to split an opposing coalition. Saddam Hussein taught this lesson very well.

Therefore, in 2025 even more than today, US forces will not be able to afford linear, sequential campaigns that require discrete staging and phasing. To defeat this corrosive enemy of time, the operational level of war must be pushed toward the execution of near-simultaneous campaigns that, at the theater-operational level, will take on the characteristic

of a *coup de main*. Operational acceleration of this magnitude can only be achieved by moving beyond joint toward interdependent operations. Interdependence suggests the need for a level of interoperability between land, sea, and aerospace mediums that will allow a near-simultaneous application of precision fires and maneuver applied in a broad pattern of effects that strike and check the enemy everywhere he can be seen and engaged. Sequenced campaigns, depicted today by delivery schedules and broad arrows on a map, will be replaced by an expansive takedown operation where the enemy's will to resist collapses when he finds himself smothered by fire and surrounded everywhere by maneuver forces occupying positions of advantage.

Interdependence also has programmatic implications. AAN believes force structures of the 2025 time period will also need to be interdependent, that is, whole functions may migrate from one service structure to another in favor of speed, agility, and economy. For example, space-based systems may well provide communications and other functions now associated with land systems. If this model holds up, quite possibly future land forces may require less expense to field and operate than previous Army forces.

### **Hybrid Forces**

The US Army has always gone to war as a hybrid force. Traditionally, dissimilar forces—heavy and light, regular and reserve, legacy and modern—have fought side by side. The problem in the past has been to get the most out of such a disparate force. In the Winter War Game, the total land force that Blue employed consisted of a mix of Army XXI units and AAN battle forces. In the environment postulated for 2025, the capabilities of these forces complemented each other very well. AAN battle forces executed rapid, strategic maneuver, while Army XXI units functioned as a force of decision, providing the total force with heft, flexibility, and a hedge against uncertainty. The challenge in this scheme will be to ensure a proper fit between the early-deploying AAN force and the slower-deploying Army XXI forces. While the former must arrive quickly to collapse the enemy, the latter must possess enough strategic agility to follow immediately behind to guarantee unrelenting long-term pressure on the enemy and to limit risk to the early-arriving force.

### **The Human Dimension**

Although discussed in greater detail further in this report, the human dimension bears mentioning here as well. AAN research indicates that battle leaders will have to function in very compressed planning and operating cycles and at very high tempos. Indications are that battlefields of 2020 will require cohesive units and leaders with higher levels of maturity. This research does not necessarily mean that the Army will require a higher

leader-to-led ratio, only that it needs a more mature, better-experienced leader and soldier than is the norm today.

## **MODELING, SIMULATION, AND FUTURE GAMES**

After a year of intense study, wargaming, and work with the other services and agencies of government, it is becoming apparent that present-day tools and perceptions only lead to more questions about the effects of technological change, the human and organizational dimension of future warfare, and the character of warfare itself.

Two-sided, open-ended war games continue to prove their worth as research tools for framing issues in the 25-year future. Free play is essential to understanding future warfare—even if Blue loses—because future success at the strategic and theater levels will increasingly depend on knowledge and other nonquantifiable advantages rather than on the more familiar attrition models that tend to favor bigger, more powerful forces. The key to gaming at strategic and theater levels is to make interaction between models and human experts as realistic as possible. WWG 1997 utilized an interactive global model with more advantages than drawbacks, but as games increase in complexity and focus, they will require more realistic models that effectively stretch a combat environment from surface to space. AAN will take this issue on as a major portion of its 1997 effort.

The Winter War Game this year postulated a war for vital interests. Consequently, game play centered at the most violent and intense end of the conventional scale of warfare. The AAN study group recognizes that to meet the needs of American defense policy in 2020, the Army must be extraordinarily *capable*, to be sure, but it must also be *adaptable* enough to be useful at the lower end of the conflict spectrum. Intuitively, an AAN force built around knowledge and speed would seem to possess characteristics essential to prevail in a conflict for “less-than-vital interests.” Exceptional mobility across inhospitable terrain, speed of deployment, and the ability to observe with exceptional clarity and to maneuver and strike with great precision all give promise that the AAN battle force postulated here would be decisive in stability and security operations against a less sophisticated enemy. The Summer War Game (SWG 1997) has been designed to test this hypothesis under conditions differing markedly from AAN games to date. The Army Special Operations Command will play as equal partners in this important exercise, and AAN will provide an analysis of the game separately and in the June 1998 report.

## **SOLDIERS AND UNITS IN 2025**

The war games demonstrated that Blue's tactical success depended to a great extent on his ability to execute decentralized operations. His strategic and tactical speed would have required an exceptional degree of mental agility and psychological resilience. We believe that the development of these qualities by 2025 will require nothing less than a cultural change within the Army that embraces a philosophy of decentralized action based upon a high degree of professional trust and confidence between leaders and led.

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**Speed and knowledge magnify importance of constant readiness. As deployment time shrinks, demand for mental agility and psychological resilience expands.**

Situations changed quickly and sometimes dramatically in the war games, which suggests that commanders will have to make decisions at consistently faster rates. Real-time battlefield knowledge may require AAN leaders to rapidly digest and act upon an indeterminate and ever-changing amount of information. In addition, the heightened speed of AAN operations may generate higher levels of physical and emotional stress, thereby creating a greater risk of cognitive and psychological impairment. AAN battle units employed a larger number of *moving parts* functioning at higher rates of speed, which in the future may force leaders at all levels to cope with increasing levels of complexity. Even armed with the advantages of sophisticated information aids, AAN leaders may find their decision-making capacities quickly overwhelmed. To execute the precise and dispersed maneuver that characterized Blue operations in the tactical war games, crews and teams will very likely be obliged to fight in a degree of isolation far more psychologically demanding than in past wars. The war games suggested that Blue forces would also need a high level of mental agility and psychological resilience to operate effectively in discrete, self-reliant, well-informed, autonomous small units.

### **EXPERIENCED LEADERS**

One way the Army can achieve and maintain the mental agility necessary for success on tomorrow's battlefield is by cultivating mature, highly experienced leaders. Such leaders provide at least four benefits: 1) mastery of increased skill sets; 2) greater experience in both command positions and staffs; 3) a firm foundation from which to exercise battlefield intuition; and 4) the ability to successfully withstand higher levels of stress due to psychological maturity and experience.

## **COHESIVE UNITS**

Stable, cohesive units can provide the requisite foundation for developing mental agility and psychological resilience. Soldiers who train together for long periods tend to adopt a shared view of the battlefield, to include their environment and their unit's ability to respond to specific combat challenges. This shared view allows leaders, peers, and subordinates to act effectively, with little or no communication, even in rapidly changing situations. Likewise, cohesive units offer the Army a greater reservoir of psychological resilience—a safety net—that offsets, to a great degree, battlefield fear, fatigue, stress, and isolation. Such units remain mentally agile even under severe circumstances. They require less supervision, handle complex tasks effectively, and exhibit mutual trust, confidence, and loyalty.

## **SOLDIER TRAINING AND EDUCATION**

Synthetic training environments, in the form of virtual, constructive, and live simulators, may allow highly effective training under conditions both safe and, in some cases, nearly indistinguishable from actual combat. In the future, newly formed units or staffs may build trust, confidence, and a state of constant readiness by working through a series of increasingly demanding exercises in a synthetic environment. Live training will remain necessary in the future to be sure. But, realistic simulators will allow live training to be reserved for *finishing exercises*. The Army should develop synthetic training to assist it in meeting the demands of the 2025 battlefield.

AAN soldiers and their units will require higher levels of mental agility and psychological resilience to successfully meet tomorrow's battlefield challenges. Experienced leaders and cohesive units should serve as the foundation for the Army's effort to develop and maintain these qualities. The goal of the AAN human and organizational effort should be to build units capable of operating within their optimal range while forcing the enemy to operate beyond his own.

## **TECHNOLOGY: THE PATH TO KNOWLEDGE AND SPEED**

The Army of 2025 will probably differ from today's Army in two fundamental ways. It will achieve unprecedented strategic and operational agility by exploiting information technologies to create a knowledge-based Army. But to know and see with greater clarity is not enough. The Army must possess a complementary capacity to act on its superior knowledge by building into its structure the physical agility to move rapidly and adroitly across a larger and more lethal battlefield. An essential body of technologies is emerging

that offers the potential to create a knowledge-based army capable of strategic and operational maneuver by 2025.

## **THE TECHNOLOGICAL CHALLENGE**

The AAN study expresses tomorrow's technological challenges in terms of the need to achieve greater knowledge and speed.

### **Knowledge**

Knowledge will proceed from a robust, redundant, and flexible network of communications and intelligence systems interwoven into a seamless surface-to-space continuum. This continuum will feature *nets* of surface sensors connected electronically to a series of interlinked UAV fields, ranging from low to very high altitudes, covered by an umbrella of space-based systems. This constellation of systems will provide an *unblinking eye* capable of constant surveillance over the battlespace and will connect the combat force with its distant support and sustainment base. It should serve as a living internet of connectivity immediately responsive to soldiers on the ground.

However, as the WWG demonstrated, an adversary may attack space systems immediately, and perhaps repeatedly, to deny knowledge dominance. Work should therefore continue in TRADOC and SSDC to identify specific land-power requirements in terms of space systems and to develop relationships that carry those needs into space technology initiatives in other services and agencies. WWG experience and follow-up research also indicate that low-, mid-, and high-altitude UAVs will become essential to maintaining knowledge dominance. Internetted UAVs serve to thicken the communications infrastructure in the event of a loss of space systems.

Mechanisms also must be established for both rapid replacement of degraded systems and seamless substitution of one information source for another. Finally, doctrine and training must accommodate the possibility of a degraded information environment; and soldiers, units, and leaders must be deliberately conditioned to sustain operational tempo notwithstanding system interruptions.

### **Speed**

The AAN views speed in strategic, operational, and tactical dimensions. The Army must pursue ways to accelerate pace of movement so that, in the tactical dimensions, close combat forces can frustrate enemy acquisition, targeting, and precision weaponry and, in



the operational and strategic dimensions, can rapidly counter, check, and ultimately collapse enemy maneuver forces.

Technologies related to self-deploying tactical forces, fast sealift, and airborne large-capacity lifting bodies currently support the acceleration of strategic projection. Although the Army does not develop new concepts or vehicles for air and sealift, these capabilities will become essential to the effective use of land power in 2025.

At the tactical and operational levels, three technologies offer possibilities for shrinking the logistical tail of fighting organizations. First, alternative power sources and fuel-efficient ultrareliable fighting vehicles will allow combat forces to operate longer and over greater distances than today. Second, cheap precision warheads, long-range fire support located outside the combat area, and alternative propellants will allow reductions in the weight and bulk of ammunition trains. Third, energy storage systems and hybrid power systems can reduce fuel and electrical power requirements and eliminate most of the weight and bulk of today's power generation and storage systems.

**[updated slide is provided separately as Slide #8]**

**To set the stage for AAN, the Army should augment its existing research and development effort by further exploring these systems and technologies.**

In addition, future ground craft, composed of advanced, lightweight materials, will enjoy greater firepower, mobility, and speed. Advanced airframes will possess increased capacities for heavy lift and tactical utility lift. These greater lift capacities will allow a marriage of ground and air systems that permits commanders to use the ground tactically for cover and concealment without suffering a degradation in mobility. Protection schemes for land power will include a host of new active protection and signature control systems. While the 2025 battle force will protect itself primarily through knowledge and speed, several emerging technologies promise to further enhance force protection. Advances in antidotes and vaccines will reduce vulnerability to chemical and biological weapons. Speed also includes rapid strategic deployment. All of the lightening technologies already mentioned have the potential to enhance deployability as well as battlefield mobility. In addition, future technology must concentrate on enhanced means of self-deployment, ultrafast sealift, and improved high-capacity airlift. Although the Army is not directly responsible for the last two, no service has a greater interest in them.

## **THE AAN SCIENCE AND TECHNOLOGY LINKAGES**

Throughout the past year, AAN has established close relationships with the science and technology community, academia, and several DOD and non-DOD government scientific agencies, most importantly, the Assistant Secretary of the Army (RD&A), Army Materiel Command, DARPA, HQDA DCSOPS, and members of the TRADOC combat developments community. AAN operational requirements influence the research efforts of the science and technology community through these relationships. Just as importantly, this collegial cooperation ensures that AAN remains apprised of further emerging technologies that might enhance its operational concepts and requirements.

**[Integrated Idea Team slide updated for Fires IIT is provided separately as Slide #9]**

**AAN and the science and technology community have formed a partnership to foster early dialogue on the nature and feasibility of future warfighting capabilities. Integrated idea teams provide a mechanism to start translating their ideas into reality.**

As the process matures, the AAN will become part of a growing number of science and technology decision-making teams. Through AAN, TRADOC has participated in the 6.1 basic research triennial review and has influenced the direction of defense strategic resource objectives and the creation of Army SROs. AAN has also provided a perspective on 6.2 science and technology objectives and advanced concepts technology demonstrations.

The Army must continue to develop partnerships within the science and technology community to create a focused set of technologies for future warfighting. Key among these is DARPA, which is already working with the Army to explore innovative concepts and technologies that apply to small-unit operations. As the pace of technological advance continues to accelerate, perspicacity in acquisition will become a strategic imperative for the Army.

## **THE ROAD AHEAD**

Although the Army in the field is operating at a very high tempo, the next few years will find the Army in a position of unchallenged military superiority and with breathing space to consider the next challenge. This window of opportunity will not last long; perhaps by the end of the century the next major military competitor will begin to show itself. In the meantime, the Army can begin to reorder its house for the challenges ahead.

Since the opportunity is fleeting, changes of the magnitude tentatively envisioned in this report must begin soon. Issues of force structuring and budget management must be

addressed within the tenure of this CSA if a new force is to begin fielding around 2010. The AAN process and its estimation of the future will continue to develop, but the AAN staff is satisfied that the major issues outlined above will remain valid. The challenge now is to begin to move from ideas and vision into action.



## **APPENDIX A**

### **CYCLES OF WAR AND INFORMATION AGE WARFARE: THE ESSENCE OF THE ARMY AFTER NEXT PROJECT**

The nature of warfare, like other forms of collective, complex human behavior, changes slowly. Cycles of change in warfare are particularly difficult to comprehend and even more difficult to anticipate because, unlike endeavors in finance, medicine or law, active experience in war is, thankfully, infrequent. Because warfare cannot be practiced often, soldiers are obliged to rely on the laboratory of past experiences to gain vicarious experience in war.

#### **THE CYCLES AND PATTERNS ARE EVIDENT**

Before the advent of the industrial age, study in the laboratory of past wars served soldiers well. Cycles of change were centuries long and factors that generated change such as demographics, politics, and relative power among contenders, while not necessarily predictable, were at least constant and familiar enough to give soldiers confidence that data derived from past campaigns would remain relevant and useful as signposts into the future. Since the beginning of the Industrial age, technological warfare—the applied science of killing—has eclipsed all other dynamics of change. For many, this magnitude and newness of science threatens the reliability of precedent as a useful mechanism for predicting the course of war.

To be sure, the frenetic pace of technological change in the modern world has served to compress the interval and stretch the amplitude of the cycles of change. Nonetheless, identifiable cycles remain. If our historical laboratory serves us, we should be able to search the recent past to identify new cycles driven principally by technology. Should we find a common pattern in technological cycles, and if we accept the premise that technology will continue to drive future change, then we should be able to use the recent past to fix the central axis aligning those cycles and project it into the future.

Technology began to dominate patterns of change with the rise of industrial production and the appearance of precision war-making machinery like rifled weapons in the mid-nineteenth century. The small bore repeating rifle, the machine gun and quick firing field artillery extended the deadly zone, or the distance that soldiers had to cross to turn a defender out of his position, from 150 meters in Napoleon's day to a thousand meters or more by the end of the American Civil War. As the deadly zone increased by nearly a factor of ten, the risks of crossing it were further multiplied by the lethality induced through the

precision and volume from the massive proliferation of repeating arms. Thus, technology favored the defender. Images of the terrible slaughter of World War I remain as testimony to the cost in blood exacted by an operational method that relied principally on killing effect to achieve decisive results.

Before the slaughter ended, military professionals on both sides of no-man's-land sought to solve the tactical and operational dilemmas imposed by dominance of firepower on the battlefield. The tactical problem simply was to cross the killing zone alive. The operational problem was to make a successful crossing militarily decisive. Once across, a force had to reach deep, concentrate and strike to dislocate and eventually disintegrate the order and cohesion of an opposing force. The conceptual solution, the innovation if you will, came first to the Germans in 1918 and it was deceptively simple: short, highly intense doses of firepower to prepare the assault; small units to exploit the shock effect of firepower in order to infiltrate and bypass centers of resistance; operational formations to move through exposed points of weakness to push deep into the enemy's rear. While the Germans had the method they lacked the means to translate theory into effective action. After the war, the development of the internal combustion engine provided the means. The graft of practical science to an innovation born in war turned the cycle of war a second time and restored dominance to the offensive. Motorized armored vehicles allowed soldiers to cross the deadly zone protected and at enormously greater speed. Large units could now dash great distances into the enemy's rear to strike at his brain and avoid his powerful extremities. The object of Blitzkrieg became the collapse of an enemy's will to resist. Victory was gained through psychological paralysis induced by movement rather than through butchery induced by massive application of firepower.

After the Second World War, the Western Powers faced another tactical and operational dilemma. The problem now was to halt a Soviet style blitzkrieg across the Northern German Plain. Tactical forces needed defensive killing power to absorb the initial Soviet armored shock and hold their defensive position. The operational problem was to strike deep with long range firepower in order to slow the rate of arrival from follow-on armored forces at the front line. Billions of dollars and the collective genius of a generation of brilliant minds succeeded in developing a remarkable set of technologies capable of stopping a mechanized offensive with precise, long-range killing power. Microchip technology provided the tools necessary to extend the killing zone and made targets easier to find, track and kill. Signs foretelling how the defensive's return to dominance might turn the cycles of war a third time began to appear as early as the closing days in Vietnam. A few laser guided bombs destroyed targets that had previously required hundreds of unguided dumb bombs. In World War II an average of eighteen rounds were needed to kill a tank at a

range of 800 yards. During the 1973 Arab-Israeli War the average was two rounds at 1200 yards, and by Desert Storm one round at 2400 yards.

The ability to see and strike deep using ground and aerial platforms served to expand the battlefield by orders of magnitude. What was once a theater area for a field army now became the area of operations for a division or a corps. Just as an army moving at two miles per hour could not cross a killing zone dominated by long-range, rapid-firing, rifled weapons in 1914, the precision revolution made it prohibitively expensive for an army moving at seven times that speed to cross an infinitely more lethal space a hundred times as large. Thus, in a conflict involving two roughly equal, or symmetrical, forces evidence seems to show convincingly that the advantage goes to the defender.

Today, seven years after the prospect of a Soviet blitzkrieg has crumbled with the same finality as the fall of the Berlin Wall, we seem strangely content to remain frozen in the third cycle. As the post industrial age begins to give way to the information age we still find comfort in a vision of future warfare that continues to emphasize the capacity to kill with greater and greater efficiency. Perhaps in our continued rush to embrace precision warfare we might find ourselves embracing a method of fighting that grows increasingly obsolete and more irrelevant with each passing day.

### **THERE IS NO SILVER BULLET**

Arguments against a firepower centered approach to warfare have been with us since the earliest days of the industrial age. War is a deadly business. Yet the object of war is not to kill the enemy so much as it is to break his will to resist. No matter how efficient and precise a firepower system might be, victory is rarely defined by killing everyone on the other side. The extension of influence or control by force is much more powerful and palatable than genocide through firepower. Therefore, our object in applying firepower must be to exploit its substantial paralytic effects to gain advantage. Unfortunately recent experiments in the laboratory of real war substantiates the view that the paralytic effects of firepower erode quickly over time. Soldiers become inured to hardships and danger. Firepower that might break an enemy formation early in a conflict eventually becomes merely a nuisance once soldiers accustom themselves to firepower's pyrotechnic drama and devise effective means to deflect, deceive, dissipate, and protect themselves from firepower's killing effects.

To win quickly and decisively at low cost in the future we must have the means to conduct the battle quickly and to end it cleanly, preferably at the moment when the paralytic effect of firepower is greatest. To delay beyond that moment only increases the

killing and makes the enemy more effective by stiffening his will to resist and by allowing him to reconstitute. Decision is best guaranteed through maneuver of forces on the ground. Psychological collapse, the breaking of an enemy's will to resist, comes when an opponent finds himself challenged and blocked wherever he turns. He admits defeat when further pursuit of his political objective is not worth the cost or when his centers of gravity are threatened, controlled or occupied and he has no remaining options for restoring them.

## **THE BALANCE BETWEEN LETHALITY AND MANEUVERABILITY**

To avoid the horrors of protracted firepower-attrition warfare in the future we must be sure to maintain a necessary but delicate symbiosis between the ability to kill and the ability to maneuver. Easier said than done if one assumes that we still dwell in the third cycle of warfare, a period that favors the defender. As we gaze into the distant future and face the prospect of a competent enemy with both the will to fight and the means to develop or purchase his own systems of precision firepower, the prospects of winning a third cycle conflict become even more sobering. Possessed with the intrinsic power of the defensive and most likely defending on familiar terrain, such a foe would not necessarily have to defeat us tactically to win the conflict. He would most probably bow to our overwhelming superiority in the air and at sea and concede both. He would not have to seek victory so much as the avoidance of defeat. He would only need to preserve his ground force in the face of superior firepower long enough to create stalemate and cause enough casualties for the Americans to tire of the contest first. Again, an enemy possessed with a will to fight at the beginning of a conflict is likely only to grow stronger over time without direct intercession and eventual domination on the ground.

## **THE OFFENSIVE MUST BE RESTORED**

The restoration of the offensive as the dominant form of war will come with the appearance of a fourth cycle of warfare, a cycle defined more by the new revolution in information rather than the stale remnants of the machine age. Imagine a maneuver force possessing the ability to see with unprecedented clarity, to anticipate with unparalleled sureness, to accelerate the pace of movement with unequaled velocity and to maintain an unrelenting operational tempo. Such a force would be able to traverse the killing ground, however expansive and lethal, relatively untouched and decide the campaign with a violent and debilitating movement that ends quickly with minimum loss of life to all sides.

The fourth cycle of war will seek to exploit the information age in order to increase the velocity of maneuver. Speed must be the essential ingredient of a future land power force.



Speed will be achieved by creating a force unburdened by the logistical yoke that has long been the principal impediment to agility and speed. The secret of the dominance of the offensive in the second cycle was not to be found in the tanks, personnel carriers, and self-propelled artillery of blitzkrieg armies. The secret lay, instead, in the ability of a portion of the maneuver force, in the case of the *Wehrmacht* just ten of a 117 divisions, to break free of the railhead long enough to reach deep into an enemy's rear with enough sustaining strength to collapse his psychological center of gravity and hold it down long enough for following forces to solidify the victory.

Today the railhead has been replaced by an equally cumbersome and constrictive logistical umbilical cord. Like the Germans in 1940 we must develop the means to break a portion of our force free to achieve the same objective. The information revolution promises to give us the means. Information technologies will allow us to deposit outside the close combat zone all but those forces necessary to move, observe and kill. Detailed knowledge of the enemy's strength will free us from our traditional fixation on stockpiling and *worst casing* so that we will be able to carry with us into the close combat zone only what we need when we need it. In effect, we will know enough to know what to leave behind.

The information revolution should allow us to track the individual elements of a force with exquisite clarity and detail. But knowledge of the enemy alone is not enough. We must possess the means to act on what we know and action is dependent, again, on speed. The combination of knowledge and speed of movement will allow a future battle force to anticipate enemy movement and turn costly force on force engagements of past wars into surer and less costly engagements by choice.

The combination of knowledge and speed will allow a battle force to maintain an unrelenting tempo. In the chess game of operational planning, superior battlefield awareness will enable us to stay four or five moves ahead of an opponent. Speed will allow battle forces to shift quickly about the battlefield to check, block, and, when conditions are optimal, strike in a ratio of friendly action to enemy reaction of, again, perhaps four or five to one. Thus the object of a maneuver force of this type will not be to kill so much as to paralyze, to exploit the ability to maintain a constant advantage of position in order to close an enemy's options, wear him down, and eventually collapse his will. Speed of maneuver offers the essential finishing function that balances our already prodigious ability to kill.

The imperative for speed in this new form of warfare begins at home ports, airfields and installations. A highly lethal force, shorn of its Cold War impedimenta, will be able to project itself from the homeland or from strategic points overseas in days rather than weeks or months and arrive in the operational theater ready to fight. The ability to get into a

theater “firstest with the mostest” reduces risk to forces first to arrive and prevents the enemy from setting himself into an advantageous defensive position. Early arrival will change the elemental patterns of war at the theater level. Such a campaign will allow near simultaneous rather than sequential applications of both killing power and maneuver. Strategic speed will allow a theater war to take the form of a coup de main. The bloody, set piece, sequential campaigns of the industrial age will give way to sharp, intense acts of strategic preemption.

A land power force optimized to capture the benefits of the information age would take on physical characteristics distinctly different from industrial age armies. First, such a force would be able to divide itself into two functional groups: the first, essentially sustaining in character, might be removed from the combat zone entirely, relying on sure communications and rapid aerial logistics to deliver the goods and services of war to the combat zone in just the proper quantities just when needed. The combat force would become the second major group. It must be compact, possessing just the people and gear necessary to sense, track, move and kill. Many essential combat functions necessary in contemporary armies would displace from the ground upward into the exosphere and space. This *space-to-surface continuum* between close combat force and the information structures which sustain it from above would, in fact, form the central nexus of an information age maneuver force. In effect, space becomes the new high ground. When all the services occupy vertically oriented battlespace, the character of multiservice missions changes from the segregated land, sea, and air operations to a new approach which will be characterized by total interdependence throughout this surface to space continuum.

### **UNPRECEDENTED BATTLESPACE AWARENESS**

The ability to see the battlefield and to know the enemy, combined with the speed to exploit these advantages, will fundamentally change the dynamics of fire and maneuver. A commander able to observe enemy movement with fine granularity would be able with confidence to divide his own forces into comparably fine increments and position each precisely enough to control and dominate each discrete bit of enemy combat power. The ability to employ many small units at once would allow a commander to cover a large operational area with discrete combat elements. A sports analogy is particularly descriptive: a basketball team with superior speed, agility and understanding of the opposition would be more effective playing man-to-man rather than zone.

A commander with the dual advantage of speed and killing power will dominate the battlefield. Superior killing power allows incapacitation of an enemy force, a necessary

capability, but by itself intrinsically indecisive. Superior mobility allows exploitation of the temporary advantage gained by the stunning effect of killing power. If these two essential elements of combat power are orchestrated with skill so that they are applied in harmony, an unfettered battle force would be able to strike multiple vital points simultaneously or in a sequence of our choosing. In a very short time, perhaps only hours, such a force would be able to inflict a rapid sequence of local tactical disasters. The cumulative effect of these closely spaced events would serve to dislocate and confuse an enemy to the point that his warfighting structures quickly disintegrate. This confusion, dislocation, and disintegration will combine to produce an unequivocal military decision with minimum cost to both sides.

### **EXPERIMENTATION AND INNOVATION**

The image of a landpower force to accomplish such deeds is purely conceptual today. But certain realities have begun to appear dimly through the veil of the future. First, at a time when American arms will most likely be called on to win an offensive campaign cheaply, the third cycle seems to tell us that the advantage goes to the defender. The offensive cannot be restored by firepower alone because firepower cannot provide the essential decisive function necessary to end a campaign quickly on our terms at minimum cost. Second, even when preceded by overwhelming doses of precision firepower, a maneuvering force cannot hope to succeed against a determined, thinking enemy if its speed of movement cannot exceed the twenty kilometer per hour pace of a third cycle force. An information age army must move at ten times that velocity. Finally, as in past cycles, technology promises a way out of this dilemma. The information revolution will give land forces both the mental agility and matching physical speed to restore the essential balance between firepower and maneuver on a future battlefield.

Henry Ford never met Heinz Guderian, the German General commonly held most responsible for exploiting Ford's invention to gain victory on the battlefield. Likewise, history will eventually produce the warrior who will capitalize on the opportunities offered by Bill Gates and the revolution most often associated with his name. The name and nationality of the warrior who someday will proclaim himself the Guderian of the information age has yet to be recognized. But one fact is certain: the information revolution will continue to alter our world at an ever increasing pace whether we choose to engage ourselves in it or not. We cannot remain fixed on the third cycle of warfare for much longer. Already competing nations are striving to chip away at America's dominance in precision fires. Sooner or later someone will find a way to match or counter our firepower advantage. The result may well be equilibrium on the battlefield which might lead to stalemate or eventual defeat. Imperatives for innovation and change are overdue. We need to begin

now to forge a new marriage between battlefield knowledge and unprecedented landpower speed. We must do no less than draw the outline for a new army whose structure is predicated on the premise that the machine age is past and the age of information has just begun.